I. Navy ODS Advisory 96-03A

II. Subj: Shipboard Refrigerant Leak Repair and Record Keeping

III. References:
(a) Navy ODS Advisory 96-03, Shipboard Refrigerant Leak Repair and Record Keeping dated 30 AUG 96
(b) CNO WASHINGTON DC 051558Z JUN 96, Navy Policy On Regulation Of Shipboard Air Conditioning And Refrigeration Systems
(c) 40 CFR 82 Subpart F--National Emission Reduction and Recycling Program
(d) COMSC 211207Z JUN 96 Shipboard Refrigerant Leakage
(e) OPNAVINST 5090.1B, Change Notice 2 dated 09 SEP 99
(f) NSTM S9086-RW-STM-010 Chapter 516 Refrigeration

IV. Cancellation: This advisory cancels and replaces Reference (a).

V. Applicability: All Navy Ships Operating Refrigerating Units With A Charge Greater Than 50 lbs.

VI. Background:

A. Reference (b) states that air-conditioning and refrigeration (AC&R) systems designed or built to military specifications on board ships owned, operated, or bare-boat chartered by the U.S. Navy and Military Sealift Command (MSC) fall under the reference (c) exemption for military-unique systems. Therefore, these systems are not subject to the requirements of reference (c), including those requirements that are related to AC&R leakage rates.

B. Although exempted systems are not subject to the requirements of reference (c), reference (b) also states that the Navy is committed to minimizing refrigerant leakage from AC&R systems. Reference (b) sets leakage-rate performance goals of 15% for air-conditioning systems and 35% for refrigeration systems. Navy and MSC ships operating AC&R systems built to General Specifications or Military Specifications with an installed refrigerant charge of 50 pounds or more and that contain R-11, R-12, R-114, R-22, R-134a, or R-236fa shall adopt these performance goals.

C. Many AC&R systems on board ships owned, operated, or bare-boat chartered by the MSC are built to commercial specifications and therefore are subject to the requirements of reference (c). Owners and operators of systems that are not military unique should follow the guidance outlined in reference (d).

VII. Action:

A. In accordance with reference (b), AC&R systems built to military specifications aboard Navy and MSC ships with an installed refrigerant charge of 50 pounds or more shall adopt the following performance goals:

1. Ensure that the annualized leakage rate from shipboard chilled-water air-conditioning systems does not exceed 15% of the total installed charge.

2. Ensure that the annualized leakage rate from ship-stores and cargo refrigeration systems does not exceed 35% of the total installed charge.

B. Method By Which To Measure And Monitor Refrigerant Leakage: Attachments (1) and (2) are provided to assist ships force in complying with these requirements. These forms are provided for guidance only and may be revised or substituted to suit individual needs. The rate at which refrigerant is leaking from shipboard AC&R equipment can be estimated using the following procedure:

1. Attachment (1) is a day-to-day Service/Maintenance Report Log that can be used to document all service and maintenance conducted on AC&R systems. Attachment (1) is used to keep track of a system's refrigerant consumption. This form is also used to estimate the system's leakage rate in order to determine compliance with reference (b).

2. Identify Total Installed Charge: The total installed charge of the system may be obtained from the system technical manual, Fleet Technical Support Center representative, or the In-Service Engineering Agent.

3. Identify Maximum Allowable Annual Leakage Rate: Using paragraphs VII.A.1. and VII.A.2., determine whether the maximum allowable annual leakage rate for the system is 15% or 35%.

4. Accidental Discharges and Refrigerant Removal: Between refrigerant chargings, it is possible that refrigerant has been removed or recovered from a system or an accidental discharge or venting has occurred. These events should not be considered when estimating system leakage; and failure to record and account for refrigerant removal and accidental discharge will cause the technician to calculate higher-than-actual leakage rates. Therefore, refrigerant removal and accidental discharges should always be recorded by technicians. The amount of refrigerant removed from a system can be accurately estimated by measuring the change in weight of recovery cylinders and should always be recorded on Attachment (1). The amount of refrigerant lost through accidental discharges must be estimated by the trained technician and should always be recorded on Attachments (1) and (2).

5. Net Leakage: The net leakage of a system refers to the system's net refrigerant leakage or net refrigerant consumption. The net leakage is often calculated each time refrigerant is added to a system and covers the period of time since refrigerant was last added to the system. The net leakage can be calculated as follows: Net Leakage (lbs) Since Last Charging = (Refrigerant Added (lbs) Since Last Charging) - (Refrigerant Removed (lbs) Since Last Charging) - (Losses Due To Accidental Discharge or Venting (lbs) Since Last Charging).

6. Annualized Leakage Rate: The annualized leakage rate in terms of percent per year can be estimated by dividing the system's net refrigerant leakage (paragraph 5, above) by its installed charge (paragraph 2, above) and prorating the result over the entire year. The following formula may be used:

$$\text{Annualized Leakage Rate (\%)} = \frac{\text{Net Leakage (lbs)}}{\text{Installed Charge (lbs)}} \times \frac{\text{365 (days/yr)}}{\text{Days Since Refrigerant Last Added (days)}} \times 100$$

The result of this formula should be compared to the system's maximum allowable annual leakage rate (paragraph 3, above). If the system is exceeding its maximum allowable annual leakage rate, then shipboard personnel should take immediate action to repair leaks.

C. Points of Contact:

1. CNO:
   a. Gail Weston, CNO N451, commercial (703) 602-7871, DSN 332-7871, facsimile (703) 602-2676, weston.gail@hq.navy.mil.

2. COMNAVSEASYSCOM:
   a. Greg Toms (Fleet Implementation), NAVSEA 05L12, commercial (703) 602-9025 x501, DSN 332-9025 x501, facsimile (703) 602-6808, tomsgs@navsea.navy.mil.

3. COMSC:
   a. Joe Bohr, Military Sealift Command Code N72PC, commercial (202) 685-5771, facsimile (202) 685-5224, joseph.bohr@msc.navy.mil.

4. Navy Shipboard Environmental Information Clearinghouse:
   a. For general questions on ODSs or to receive information on alternatives to ODSs, contact the Navy Shipboard Environmental Information Clearinghouse, (703) 416-1132, ozone@navyseic.com, http://www.navyseic.com.

D. Incorporation of Advisory:

1. This advisory will be incorporated in the next revision of references (e) and (f).

VIII. Advisories In Effect:

Advisory	Subject	Applicability:
95-01	Canceled and Superseded by 95-01A	
95-01A	Mission-Critical Applications of Class I Ozone-Depleting Substances	All Navy Operating Forces and All Activities and Facilities Supporting Operational Units
96-01	Canceled and Superseded by 96-01A	
96-01A	Canceled and Superseded by 96-01B	
96-01B	Canceled and Superseded by 96-01C	
96-01C	Ozone-Depleting Substance (ODS) Supply Support	All Navy Operating Forces, New Ship Construction, and All Activities and Facilities Supporting Operational Units
96-02	Canceled and Superseded by 96-02A	
96-02A	Refrigerant Leak Repair and Record Keeping	All Navy Activities and Facilities Owning Or Operating Air-Conditioning and Refrigeration (AC&R) Units Greater than 50 lbs.
96-03	Canceled and Superseded by 96-03A	

96-03A	Shipboard Refrigerant Leak Repair and Record Keeping	All Navy Ships Operating Refrigerating Units With A Charge Greater Than 50 lbs.

Service/Maintenance Report Log

Appliance/Unit Number _____ Total Installed Charge _____ Maximum Allowable Annual Leakage Rate [1] _____

Date	Service / Maintenance Action	Technician	Refrigerant Added (lbs)	Refrigerant Removed (lbs)	Loss Due To[2] Accidental Venting (lbs)	Net Leakage[3] (lbs)	Annualized Leakage Rate[4] (%)	Leak Repaired (Yes/No/NA)	Comments

Notes:

1. Maximum Annual Leakage = 35% (Refrigeration) or 15% (Air Conditioning).
2. Each time an accidental or unintentional release occurs, the technician must document the release on an accidental/unintentional release form (Attachment (2)).
3. Net Leakage (lbs) Since Last Charging = Refrigerant Added (lbs) Since Last Charging - Refrigerant Removed (lbs) Since Last Charging - Loss Due to Accidental or Unintentional Venting (lbs) Since Last Charging.
4. Annualized Leakage Rate = (Net Leakage / Installed Charge) x (365 / Number of Days Since Refrigerant Last Added) x 100

Maintain For Record Purposes For 3 Years

Attachment (1)

Accidental or Unintentional Venting Report

Date _____

Location_____

Refrigeration Unit _____

Type of Refrigerant Vented _____ Approx. How Many Pounds Were Vented _____

Description of Accidental Venting Incident _____

_____

_____

_____

_____

_____

_____

_____

_____

_____

What Was the Cause of the Release? _____

_____

_____

_____

_____

What Precautions Have Been Taken To Prevent This From Happening Again? _____

_____

_____

_____

Technician Name/Rank or Grade _____ Certification Number _____

Engineering Officer Signature_____ Date _____

Engineering Officer Printed Name and Rank _____

Maintain For Record Purposes For 3 Years

Attachment (2)